

PHOTOCATALYTIC NANOCRYSTALLINE TiO₂ THIN FILMS,
METHOD FOR PREPARING THE SAME AND USE THEREOF

Yu et al.

Appl. No.: 10/688,504 Atty Docket: INSIG1.001AUS

Appendix A



GO

DOW Surfactants

Applications

Products

Alkyl Polyglucosides
Branched
Secondary Alcohol
Ethoxylates
Ethylene Oxide /
Propylene Oxide
Copolymers
Low Foam
Surfactants
Nonylphenol
Ethoxylates (NPE)
Octylphenol
Ethoxylates
Secondary Alcohol
Ethoxylates
Specialty
Alkoxylates
Alkyldiphenyloxide
Disulfonate Salts
Dioctyl
Sulfosuccinates
Phosphate Esters
Sulfates and
Sulfonates

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Surfactants Product Finder

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Surfactants Home

Octylphenol Ethoxylates

TRITON™ X Series surfactants are versatile nonionic surfactants recognized for their wetting, detergency, superior hard surface, metal cleaning and excellent emulsification performance. TRITON X Series surfactants are used in almost every type of liquid, paste, and powdered cleaning compound, ranging from heavy-duty industrial products to gentle detergents. They are important ingredients of primary emulsifier mixtures used in the manufacture of emulsion polymers and stabilizers in latex polymers. TRITON X Series surfactants are recognized for pigment wetting and stabilization in coatings, and are offered in a range of HLB to match specific wetting and dispersing requirements.

Use our convenient [SDS Finder](#) to quickly find Safety Data Sheets on our products. For more information, please [contact us](#).

Product	Features/Applications
TRITON X-15 Technical Data Sheet (45KB PDF)	Oil soluble emulsifier, solubilizer. Uses: Defoamer, dye solubilizer, chemical intermediate
TRITON X-35 Technical Data Sheet (15KB PDF)	Excellent compatibility with hydrocarbons and other organic solvents. Uses: Defoamers, pulp & paper, textile, dry cleaning, metal working fluids
TRITON X-45 Technical Data Sheet (88KB PDF)	Excellent emulsifier with good wetting, aids in rinseability of solvent-based systems. Uses: Defoamers, cleaners, metalworking fluids, agrochemicals, paints & coatings, textile, pulp & paper, oilfield chemicals
TRITON X-114 Technical Data Sheet (15KB PDF)	Excellent wetting and detergency. Uses: Cleaners, paints & coatings, pulp & paper, textile, agrochemicals, metal working fluids, oilfield chemicals
TRITON X-100 Technical Data Sheet (46KB PDF)	Excellent detergent, dispersant and emulsifier for oil-in-water systems. Uses: Household & industrial cleaners, paints & coatings, pulp & paper, textile, agrochemical, metal working fluids, oilfield chemicals
TRITON X-102 Technical Data Sheet (90KB PDF)	Excellent detergent and dispersant. Uses: Dispersions, high temperature systems
TRITON X-165 (70%) Technical Data Sheet (46KB PDF)	Excellent emulsion stabilizer and dispersant. Uses: Paints & coatings, dispersions
TRITON X-305 (70%) Technical Data Sheet (45KB PDF)	Excellent emulsion stabilizers, provides freeze thaw and ionic stability. Uses: Emulsion polymerization, paints & coatings, floor polish, wax emulsions
TRITON X-405 (70%) Technical Data Sheet (15KB PDF)	Excellent emulsion stabilizers, provides freeze thaw and ionic stability. Uses: Emulsion polymerization, paints & coatings, floor polish, wax emulsions
TRITON X-705 (70%) Technical Data Sheet (86KB PDF)	Excellent emulsion stabilizers, provides freeze thaw and ionic stability. Uses: Emulsion polymerization

PDF)

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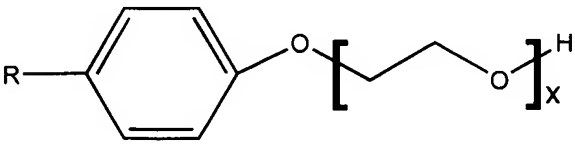
Surfactants Home : Products : Octylphenol Ethoxylates

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DOW Surfactants

TRITON™ X-15 Surfactant

Benefits <ul style="list-style-type: none"> Oil soluble emulsifier Very low HLB Good solubilizer & defoamer Excellent compatibility with both polar organic and non-polar solvents 	Applications <ul style="list-style-type: none"> Defoamer for paper production, textile processing, and paints & coatings Chemical intermediate Dye solubilizer 																														
Physical Properties <table> <tr> <td>Actives, wt%</td><td>100</td></tr> <tr> <td>Solvent</td><td>None</td></tr> <tr> <td>Appearance</td><td>Transparent, yellow liquid</td></tr> <tr> <td>Cloud point, 1% aq solution, °C (°F)</td><td>Insoluble</td></tr> <tr> <td>HLB</td><td>4.9</td></tr> <tr> <td>pH, 5% aq solution</td><td>7.1</td></tr> <tr> <td>Viscosity at 25°C (77°F), cP</td><td>790</td></tr> <tr> <td>Density at 25°C (77°F), g/mL</td><td>0.989</td></tr> <tr> <td>Flash Pt, Closed Cup, ASTM D93</td><td>171°C 340°F</td></tr> <tr> <td>Pour point, °C (°F)</td><td>3 (37)</td></tr> </table> <p>NOTE: Additional physical and chemical property data is located on the product Material Safety Data Sheet.</p>	Actives, wt%	100	Solvent	None	Appearance	Transparent, yellow liquid	Cloud point, 1% aq solution, °C (°F)	Insoluble	HLB	4.9	pH, 5% aq solution	7.1	Viscosity at 25°C (77°F), cP	790	Density at 25°C (77°F), g/mL	0.989	Flash Pt, Closed Cup, ASTM D93	171°C 340°F	Pour point, °C (°F)	3 (37)	Performance Properties <table> <tr> <td>Equilibrium surface tension¹, dynes/cm</td><td>Insoluble</td></tr> <tr> <td>Dynamic surface tension², dynes/cm</td><td>Insoluble</td></tr> <tr> <td>Critical micelle concentration in distilled water at 25°C (77°F), ppm</td><td>Insoluble</td></tr> <tr> <td>Draves 25 sec wetting conc, wt%</td><td>Insoluble</td></tr> <tr> <td>Ross-Miles Foam Test</td><td>Insoluble</td></tr> </table> <p>¹Measured at 0.1 wt% and 25 °C (77 °F) ²Measured at 0.1 wt% and 25 °C (77 °F), Maximum Bubble Pressure at 4 bubbles/sec</p>	Equilibrium surface tension ¹ , dynes/cm	Insoluble	Dynamic surface tension ² , dynes/cm	Insoluble	Critical micelle concentration in distilled water at 25°C (77°F), ppm	Insoluble	Draves 25 sec wetting conc, wt%	Insoluble	Ross-Miles Foam Test	Insoluble
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Solubility and Compatibility <ul style="list-style-type: none"> Insoluble in water Soluble in aliphatic hydrocarbons Miscible in polar organic solvents & aromatic hydrocarbons Chemically stable in many acidic & alkaline solutions Compatible with anionic, cationic, and other nonionic surfactants 	Chemical Description Name: Octylphenol ethoxylate Surfactant Type: Nonionic <div data-bbox="841 1501 1412 1648">  </div> <p>R = octyl (C8) x = 1.5 (avg)</p>																														

Additional product information and performance data is available by requesting datasheets that are listed on the backside of this page.

Datasheets

- DOW Specialty Surfactants Reference Chart, 119-01491
- TRITON & TERGITOL Surfactants for Household, Industrial & Institutional Cleaning CD, 119-01465-0501
- TRITON & TERGITOL Surfactants for Agrochemical Applications CD, 119-01540
- TRITON & TERGITOL Surfactants for Paint, Coatings, Adhesives, Stabilizers & Emulsion Polymerization CD, 119-01536
- Contact DOW Customer Service for current listing on conformance of TRITON Surfactants with U.S. FDA and EPA Regulations

DOW Surfactants

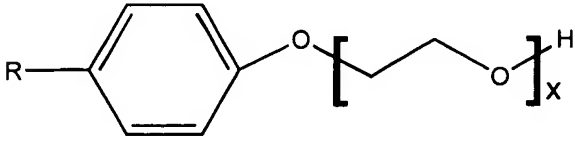
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DOW Surfactants

TRITON® X-35 Surfactant

Benefits <ul style="list-style-type: none"> Oil soluble, low HLB emulsifier Defoamer Excellent compatibility with both polar organic & non-polar solvents Aids in rinseability and provides coupling in solvent-based systems 	Applications <ul style="list-style-type: none"> Emulsifier & detergent for dry cleaning Detergent & solubilizer for other cleaners Defoamer for paper production, textile processing, and paints & coatings Emulsifier for metalworking fluids Chemical intermediate 																														
Physical Properties <table> <tr> <td>Actives, wt%</td><td>100</td></tr> <tr> <td>Solvent</td><td>None</td></tr> <tr> <td>Appearance</td><td>Transparent, yellow liquid</td></tr> <tr> <td>Cloud point, 1% aq solution, °C (°F)</td><td>Insoluble</td></tr> <tr> <td>HLB</td><td>7.8</td></tr> <tr> <td>pH, 5% aq solution</td><td>7.9</td></tr> <tr> <td>Viscosity at 25°C (77°F), cP</td><td>370</td></tr> <tr> <td>Density at 25°C (77°F), g/mL</td><td>1.013</td></tr> <tr> <td>Flash Pt, Closed Cup, ASTM D93</td><td>199°C 390°F</td></tr> <tr> <td>Pour point, °C (°F)</td><td>-9 (16)</td></tr> </table> <p>NOTE: Additional physical and chemical property data is located on the product Material Safety Data Sheet.</p>	Actives, wt%	100	Solvent	None	Appearance	Transparent, yellow liquid	Cloud point, 1% aq solution, °C (°F)	Insoluble	HLB	7.8	pH, 5% aq solution	7.9	Viscosity at 25°C (77°F), cP	370	Density at 25°C (77°F), g/mL	1.013	Flash Pt, Closed Cup, ASTM D93	199°C 390°F	Pour point, °C (°F)	-9 (16)	Performance Properties <table> <tr> <td>Equilibrium surface tension¹, dynes/cm</td><td>Insoluble</td></tr> <tr> <td>Dynamic surface tension², dynes/cm</td><td>Insoluble</td></tr> <tr> <td>Critical micelle concentration in distilled water at 25°C (77°F), ppm</td><td>Insoluble</td></tr> <tr> <td>Draves 25 sec wetting conc, wt%</td><td>Insoluble</td></tr> <tr> <td>Ross-Miles Foam Test</td><td>Insoluble</td></tr> </table> <p>¹Measured at 0.1 wt% and 25 °C (77 °F) ²Measured at 0.1 wt% and 25 °C (77 °F), Maximum Bubble Pressure at 4 bubbles/sec</p>	Equilibrium surface tension ¹ , dynes/cm	Insoluble	Dynamic surface tension ² , dynes/cm	Insoluble	Critical micelle concentration in distilled water at 25°C (77°F), ppm	Insoluble	Draves 25 sec wetting conc, wt%	Insoluble	Ross-Miles Foam Test	Insoluble
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Solubility and Compatibility <ul style="list-style-type: none"> Insoluble in water Soluble in aliphatic hydrocarbons Miscible in polar organic solvents & aromatic hydrocarbons Chemically stable in many acidic & alkaline solutions Compatible with anionic, cationic, and other nonionic surfactants 	Chemical Description Name: Octylphenol ethoxylate Surfactant Type: Nonionic <div style="text-align: center;">  </div> <p>R = octyl (C8) x = 3 (avg)</p>																														

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DOW Surfactants

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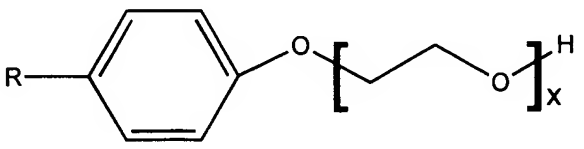
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DOW Surfactants

TRITON® X-45 Surfactant

Benefits <ul style="list-style-type: none"> • Excellent emulsifier & good wetting agent • Low foam • Good compatibility with both polar & non-polar solvents • Aids in rinseability and provides coupling in solvent-based systems • Increases oily soil removal in water-based systems • Readily biodegradable (OECD 301E) 	Applications <ul style="list-style-type: none"> • Coupling agent & detergent for solvent & water-based cleaners & degreasers • Defoamer and wetting agent for paper production, textile processing, and paints & coatings • Emulsifier, defoamer, and wetting agent for metalworking fluids, agrochemicals, and oilfield applications 																																
Physical Properties <table> <tr> <td>Actives, wt%</td><td>100</td></tr> <tr> <td>Solvent</td><td>None</td></tr> <tr> <td>Appearance</td><td>Transparent, yellow liquid</td></tr> <tr> <td>Cloud point, 1% aq solution, °C (°F)</td><td>Dispersible</td></tr> <tr> <td>HLB</td><td>9.8</td></tr> <tr> <td>pH, 5% aq solution</td><td>6</td></tr> <tr> <td>Viscosity at 25°C (77°F), cP</td><td>290</td></tr> <tr> <td>Density at 25°C (77°F), g/mL</td><td>1.031</td></tr> <tr> <td>Flash Pt, Closed Cup, ASTM D93</td><td>218°C 425°F</td></tr> <tr> <td>Pour point, °C (°F)</td><td><-6 (<21)</td></tr> </table> <p>NOTE: Additional physical and chemical property data is located on the product Material Safety Data Sheet.</p>	Actives, wt%	100	Solvent	None	Appearance	Transparent, yellow liquid	Cloud point, 1% aq solution, °C (°F)	Dispersible	HLB	9.8	pH, 5% aq solution	6	Viscosity at 25°C (77°F), cP	290	Density at 25°C (77°F), g/mL	1.031	Flash Pt, Closed Cup, ASTM D93	218°C 425°F	Pour point, °C (°F)	<-6 (<21)	Performance Properties <table> <tr> <td>Equilibrium surface tension¹, dynes/cm</td><td>31</td></tr> <tr> <td>Dynamic surface tension², dynes/cm</td><td>50</td></tr> <tr> <td>Critical micelle concentration in distilled water at 25°C (77°F), ppm</td><td>57</td></tr> <tr> <td>Draves 25 sec wetting conc, wt% at 25°C (77°F)</td><td>0.04</td></tr> <tr> <td>Ross-Miles Foam Test, Initial/5 min, 0.1% at 25°C (77°F), mm</td><td>20/10</td></tr> <tr> <td>50°C (122°F)</td><td>16/10</td></tr> </table> <p>¹Measured at 0.1 wt% and 25 °C (77 °F) ²Measured at 0.1 wt% and 25 °C (77 °F), Maximum Bubble Pressure at 4 bubbles/sec</p>	Equilibrium surface tension ¹ , dynes/cm	31	Dynamic surface tension ² , dynes/cm	50	Critical micelle concentration in distilled water at 25°C (77°F), ppm	57	Draves 25 sec wetting conc, wt% at 25°C (77°F)	0.04	Ross-Miles Foam Test, Initial/5 min, 0.1% at 25°C (77°F), mm	20/10	50°C (122°F)	16/10
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Solubility and Compatibility <ul style="list-style-type: none"> • Dispersible in water • Slightly soluble in aliphatic hydrocarbons • Miscible in most polar organic solvents & aromatic hydrocarbons • Chemically stable most acidic & alkaline solutions • Compatible with anionic, cationic, and other nonionic surfactants 	Chemical Description Name: Octylphenol ethoxylate Surfactant Type: Nonionic <div style="text-align: center;">  </div> <p>R = octyl (C8) x = 4.5 (avg)</p>																																

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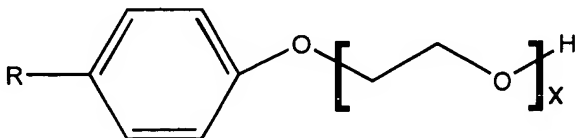
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- Contact DOW Customer Service for current listing on conformance of TRITON Surfactants with U.S. FDA and EPA Regulations

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DOW Surfactants

TRITON® X-114 Surfactant

Benefits <ul style="list-style-type: none"> • Excellent emulsifier • Highly effective wetting agent • Good detergency • Excellent for use at low temperatures • Readily biodegradable (OECD 301E) 	Applications <ul style="list-style-type: none"> • Wetting agent & emulsifier for hard surface & metal cleaners, paper production, and textile processing • Pigment and substrate wetting agent for paints & coatings • Emulsifier and process aid for metalworking fluids, agrochemicals, and oilfield applications 																																
Physical Properties <table> <tr> <td>Actives, wt%</td><td>100</td></tr> <tr> <td>Solvent</td><td>None</td></tr> <tr> <td>Appearance</td><td>Transparent, pale yellow liquid</td></tr> <tr> <td>Cloud point, 1% aq solution, °C (°F)</td><td>25 (77)</td></tr> <tr> <td>HLB</td><td>12.3</td></tr> <tr> <td>pH, 5% aq solution</td><td>6</td></tr> <tr> <td>Viscosity at 25°C (77°F), cP</td><td>260</td></tr> <tr> <td>Density at 25°C (77°F), g/mL</td><td>1.052</td></tr> <tr> <td>Flash Pt, Closed Cup, ASTM D93</td><td>254°C 490°F</td></tr> <tr> <td>Pour point, °C (°F)</td><td><-6 (<21)</td></tr> </table> <p>NOTE: Additional physical and chemical property data is located on the product Material Safety Data Sheet.</p>	Actives, wt%	100	Solvent	None	Appearance	Transparent, pale yellow liquid	Cloud point, 1% aq solution, °C (°F)	25 (77)	HLB	12.3	pH, 5% aq solution	6	Viscosity at 25°C (77°F), cP	260	Density at 25°C (77°F), g/mL	1.052	Flash Pt, Closed Cup, ASTM D93	254°C 490°F	Pour point, °C (°F)	<-6 (<21)	Performance Properties <table> <tr> <td>Equilibrium surface tension¹, dynes/cm</td><td>30</td></tr> <tr> <td>Dynamic surface tension², dynes/cm</td><td>38</td></tr> <tr> <td>Critical micelle concentration in distilled water at 25°C (77°F), ppm</td><td>100</td></tr> <tr> <td>Draves 25 sec wetting conc, wt% at 25°C (77°F)</td><td>0.04</td></tr> <tr> <td>Ross-Miles Foam Test, Initial/5 min, 0.1% at 25°C (77°F), mm</td><td>60/40</td></tr> <tr> <td>50°C (122°F)</td><td>25/22</td></tr> </table> <p>¹Measured at 0.1 wt% and 25 °C (77 °F) ²Measured at 0.1 wt% and 25 °C (77 °F), Maximum Bubble Pressure at 4 bubbles/sec</p>	Equilibrium surface tension ¹ , dynes/cm	30	Dynamic surface tension ² , dynes/cm	38	Critical micelle concentration in distilled water at 25°C (77°F), ppm	100	Draves 25 sec wetting conc, wt% at 25°C (77°F)	0.04	Ross-Miles Foam Test, Initial/5 min, 0.1% at 25°C (77°F), mm	60/40	50°C (122°F)	25/22
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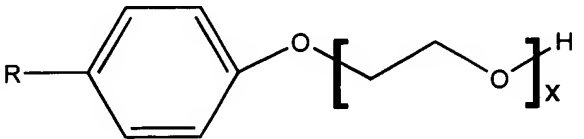
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DOW Surfactants

TRITON™ X-100 Surfactant

Benefits <ul style="list-style-type: none"> • Excellent detergent & oil-in-water emulsifier for many applications • Excellent wetting agent • Effective performance across a broad temperature range • Readily biodegradable (OECD 301B & E) 	Applications <ul style="list-style-type: none"> • Detergent & wetting agent for hard surface cleaners, metal cleaners, paper production, and textile processing • Wetting agent and dispersant for paints & coating systems • Emulsifier & process aid for metalworking fluids, agrochemicals, and oilfield applications 																																
Physical Properties <table> <tr> <td>Actives, wt%</td><td>100</td></tr> <tr> <td>Solvent</td><td>None</td></tr> <tr> <td>Appearance</td><td>Transparent, pale yellow liquid</td></tr> <tr> <td>Cloud point, 1% aq solution, °C (°F)</td><td>66 (151)</td></tr> <tr> <td>HLB</td><td>13.4</td></tr> <tr> <td>pH, 5% aq solution</td><td>6</td></tr> <tr> <td>Viscosity at 25°C (77°F), cP</td><td>240</td></tr> <tr> <td>Density at 25°C (77°F), g/mL</td><td>1.061</td></tr> <tr> <td>Flash Pt, Closed Cup, ASTM D93</td><td>251°C 485°F</td></tr> <tr> <td>Pour point, °C (°F)</td><td>2 (36)</td></tr> </table> <p>NOTE: Additional physical and chemical property data is located on the product Material Safety Data Sheet.</p>	Actives, wt%	100	Solvent	None	Appearance	Transparent, pale yellow liquid	Cloud point, 1% aq solution, °C (°F)	66 (151)	HLB	13.4	pH, 5% aq solution	6	Viscosity at 25°C (77°F), cP	240	Density at 25°C (77°F), g/mL	1.061	Flash Pt, Closed Cup, ASTM D93	251°C 485°F	Pour point, °C (°F)	2 (36)	Performance Properties <table> <tr> <td>Equilibrium surface tension¹, dynes/cm</td><td>31</td></tr> <tr> <td>Dynamic surface tension², dynes/cm</td><td>45</td></tr> <tr> <td>Critical micelle concentration in distilled water at 25°C (77°F), ppm</td><td>130</td></tr> <tr> <td>Draves 25 sec wetting conc, wt% at 25°C (77°F)</td><td>0.06</td></tr> <tr> <td>Ross-Miles Foam Test, Initial/5 min, 0.1% at 25°C (77°F), mm</td><td>110/100</td></tr> <tr> <td>50°C (122°F)</td><td>110/25</td></tr> </table> <p>¹Measured at 0.1 wt% and 25 °C (77 °F) ²Measured at 0.1 wt% and 25 °C (77 °F), Maximum Bubble Pressure at 4 bubbles/sec</p>	Equilibrium surface tension ¹ , dynes/cm	31	Dynamic surface tension ² , dynes/cm	45	Critical micelle concentration in distilled water at 25°C (77°F), ppm	130	Draves 25 sec wetting conc, wt% at 25°C (77°F)	0.06	Ross-Miles Foam Test, Initial/5 min, 0.1% at 25°C (77°F), mm	110/100	50°C (122°F)	110/25
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Solubility and Compatibility <ul style="list-style-type: none"> • Soluble in water • Miscible in most polar organic solvents & aromatic hydrocarbons • Insoluble in aliphatic hydrocarbons • Chemically stable most acidic & alkaline solutions • Compatible with anionic, cationic, and other nonionic surfactants 	Chemical Description Name: Octylphenol ethoxylate Surfactant Type: Nonionic <div style="text-align: center;">  </div> <p>R = octyl (C8) x = 9.5 (avg)</p>																																

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Datasheets

- DOW Specialty Surfactants Reference Chart, 119-01491
- TRITON & TERGITOL Surfactants for Household, Industrial & Institutional Cleaning CD, 119-01465-0501
- TRITON & TERGITOL Surfactants for Agrochemical Applications CD, 119-01540
- TRITON & TERGITOL Surfactants for Paint, Coatings, Adhesives, Stabilizers & Emulsion Polymerization CD, 119-01536
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DOW Surfactants

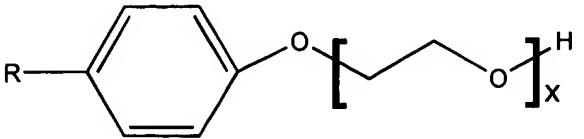
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DOW Surfactants

TRITON® X-102 Surfactant

Benefits <ul style="list-style-type: none"> • Excellent detergent & dispersant • Good wetting agent • Effective at high temperatures • Good solubilizer for less soluble nonionic & anionic surfactants 	Applications <ul style="list-style-type: none"> • Detergent & wetting agent for hard surface cleaners, metal cleaners, paper production, textile processing, and paints & coatings • Dispersant & process aid for agrochemicals, oilfield applications, and dispersion systems 																																
Physical Properties <table> <tr> <td>Actives, wt%</td><td>100</td></tr> <tr> <td>Solvent</td><td>None</td></tr> <tr> <td>Appearance</td><td>Transparent, pale yellow liquid</td></tr> <tr> <td>Cloud point, 1% aq solution, °C (°F)</td><td>88 (190)</td></tr> <tr> <td>HLB</td><td>14.4</td></tr> <tr> <td>pH, 5% aq solution</td><td>8.8</td></tr> <tr> <td>Viscosity at 25°C (77°F), cP</td><td>330</td></tr> <tr> <td>Density at 25°C (77°F), g/mL</td><td>1.070</td></tr> <tr> <td>Flash Pt, Closed Cup, ASTM D93</td><td>254°C 490°F</td></tr> <tr> <td>Pour point, °C (°F)</td><td>14 (57)</td></tr> </table> <p>NOTE: Additional physical and chemical property data is located on the product Material Safety Data Sheet.</p>	Actives, wt%	100	Solvent	None	Appearance	Transparent, pale yellow liquid	Cloud point, 1% aq solution, °C (°F)	88 (190)	HLB	14.4	pH, 5% aq solution	8.8	Viscosity at 25°C (77°F), cP	330	Density at 25°C (77°F), g/mL	1.070	Flash Pt, Closed Cup, ASTM D93	254°C 490°F	Pour point, °C (°F)	14 (57)	Performance Properties <table> <tr> <td>Equilibrium surface tension¹, dynes/cm</td><td>31</td></tr> <tr> <td>Dynamic surface tension², dynes/cm</td><td>47</td></tr> <tr> <td>Critical micelle concentration in distilled water at 25°C (77°F), ppm</td><td>140</td></tr> <tr> <td>Draves 25 sec wetting conc, wt% at 25°C (77°F)</td><td>0.06</td></tr> <tr> <td>Ross-Miles Foam Test, Initial/5 min, 0.1% at 25°C (77°F), mm</td><td>120/100</td></tr> <tr> <td>50°C (122°F)</td><td>130/45</td></tr> </table> <p>¹Measured at 0.1 wt% and 25 °C (77 °F) ²Measured at 0.1 wt% and 25 °C (77 °F), Maximum Bubble Pressure at 4 bubbles/sec</p>	Equilibrium surface tension ¹ , dynes/cm	31	Dynamic surface tension ² , dynes/cm	47	Critical micelle concentration in distilled water at 25°C (77°F), ppm	140	Draves 25 sec wetting conc, wt% at 25°C (77°F)	0.06	Ross-Miles Foam Test, Initial/5 min, 0.1% at 25°C (77°F), mm	120/100	50°C (122°F)	130/45
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Solubility and Compatibility <ul style="list-style-type: none"> • Soluble in water • Miscible in most polar organic solvents & aromatic hydrocarbons • Insoluble in aliphatic hydrocarbons • Chemically stable most acidic & alkaline solutions • Compatible with anionic, cationic, and other nonionic surfactants 	Chemical Description Name: Octylphenol ethoxylate Surfactant Type: Nonionic <div style="text-align: center;">  </div> <p>R = octyl (C8) x = 12 (avg)</p>																																

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DOW Surfactants

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TRITON® X-165 (70%) Surfactant

Dow Surfactants

Benefits

- Good emulsion stabilizer & dispersant
- Effective at high temperatures
- Good solubility in the presence of salts or electrolytes & caustic solutions

Applications

- Emulsion polymerization
- Paper & textile processing
- Paints & coatings
- Agrochemicals

Physical Properties

Actives, wt%	70
Solvent	Water
Appearance	Transparent, pale yellow liquid
Cloud point, 1% aq solution, °C (°F)	>100 (>212)
HLB	15.5
pH, 1% aq solution	8.8
Viscosity at 25°C (77°F), cP	540
Density at 20°C (68°F), g/mL	1.076
Flash Pt, Closed Cup ASTM D93	None
Pour point, °C (°F)	23 (73)

NOTE: Additional physical and chemical property data is located on the product Material Safety Data Sheet

Performance Properties

Equilibrium surface tension ¹ , dynes/cm	28
Dynamic surface tension ² , dynes/cm	50
Critical micelle concentration in distilled water at 25°C (77°F), ppm	360
Draves 20 sec wetting conc, wt% at 25°C (77°F)	0.33
Ross-Miles Foam Test, Initial/5 min, 0.1% at 25°C (77°F), mm	125/90
50°C (122°F)	145/40

¹Measured at 0.1 wt% and 25°C (77°F)²Measured at 0.1 wt% and 25°C (77°F), Maximum Bubble Pressure at 4 bubbles/sec

Solubility and Compatibility

- Soluble in water
- Miscible in most polar organic solvents
- Insoluble in aliphatic & aromatic hydrocarbons
- Chemically stable in most acids & alkaline solutions
- Compatible with anionic, cationic and other nonionic surfactants

Chemical Description

- Name: Octylphenol ethoxylate
- Surfactant Type: Nonionic

Data Sheets

- DOW Specialty Surfactants Reference Chart, 119-01491
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Contact information goes here:

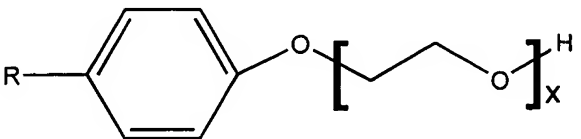
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Tel: +32 3 450 2240
Fax: +32 3 450 2815
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DOW Surfactants

TRITON™ X-305 (70%) Surfactant

Benefits <ul style="list-style-type: none"> • High HLB emulsifier & dispersant • Improves the colloidal stability of emulsion polymer systems including ionic, storage, freeze-thaw, and thermal stability • Effective at high temperatures • Good solubility in the presence of salts or electrolytes & caustic solutions 	Applications <ul style="list-style-type: none"> • Emulsion polymerization • Paints & coatings • Floor polishes • Wax emulsions • Agrochemicals 																														
Physical Properties <table> <tr> <td>Actives, wt%</td><td>70</td></tr> <tr> <td>Solvent</td><td>Water</td></tr> <tr> <td>Appearance</td><td>Transparent, pale yellow liquid</td></tr> <tr> <td>Cloud point, 1% aq solution, °C (°F)</td><td>>100 (>212)</td></tr> <tr> <td>HLB</td><td>17.3</td></tr> <tr> <td>pH, 5% aq solution</td><td>7</td></tr> <tr> <td>Viscosity at 25°C (77°F), cP</td><td>470</td></tr> <tr> <td>Density at 25°C (77°F), g/mL</td><td>1.092</td></tr> <tr> <td>Flash Pt, Closed Cup, ASTM D93</td><td>None</td></tr> <tr> <td>Pour point, °C (°F)</td><td>-10 (14)</td></tr> </table> <p>NOTE: Additional physical and chemical property data is located on the product Material Safety Data Sheet.</p>	Actives, wt%	70	Solvent	Water	Appearance	Transparent, pale yellow liquid	Cloud point, 1% aq solution, °C (°F)	>100 (>212)	HLB	17.3	pH, 5% aq solution	7	Viscosity at 25°C (77°F), cP	470	Density at 25°C (77°F), g/mL	1.092	Flash Pt, Closed Cup, ASTM D93	None	Pour point, °C (°F)	-10 (14)	Performance Properties <table> <tr> <td>Equilibrium surface tension¹, dynes/cm</td><td>40</td></tr> <tr> <td>Dynamic surface tension², dynes/cm</td><td>56</td></tr> <tr> <td>Critical micelle concentration in distilled water at 25°C (77°F), ppm</td><td>790</td></tr> <tr> <td>Ross-Miles Foam Test, Initial/5 min, 0.1% at 25°C (77°F), mm</td><td>95/50</td></tr> <tr> <td>50°C (122°F)</td><td>150/73</td></tr> </table> <p>¹Measured at 0.1 wt% and 25 °C (77 °F) ²Measured at 0.1 wt% and 25 °C (77 °F), Maximum Bubble Pressure at 4 bubbles/sec</p>	Equilibrium surface tension ¹ , dynes/cm	40	Dynamic surface tension ² , dynes/cm	56	Critical micelle concentration in distilled water at 25°C (77°F), ppm	790	Ross-Miles Foam Test, Initial/5 min, 0.1% at 25°C (77°F), mm	95/50	50°C (122°F)	150/73
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Solubility and Compatibility <ul style="list-style-type: none"> • Soluble in water • Miscible in most polar organic solvents • Insoluble in aliphatic & aromatic hydrocarbons • Chemically stable most acidic & alkaline solutions • Compatible with anionic, cationic, and other nonionic surfactants 	Chemical Description Name: Octylphenol ethoxylate Surfactant Type: Nonionic <div style="text-align: center;">  </div> <p>R = octyl (C8) x = 30 (avg)</p>																														

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Datasheets

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DOW Surfactants

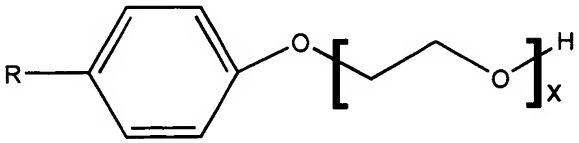
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DOW Surfactants

TRITON® X-405 (70%) Surfactant

Benefits <ul style="list-style-type: none"> • High HLB emulsifier & dispersant • Improves the colloidal stability of emulsion polymer systems including ionic, storage, freeze-thaw, and thermal stability • Effective at high temperatures • Good solubility in the presence of salts or electrolytes & caustic solutions 	Applications <ul style="list-style-type: none"> • Emulsion polymerization • Paints & coatings • Floor polishes • Wax emulsions • Agrochemicals 																												
Physical Properties <table> <tr> <td>Actives, wt%</td><td>70</td></tr> <tr> <td>Solvent</td><td>Water</td></tr> <tr> <td>Appearance</td><td>Transparent, pale yellow liquid</td></tr> <tr> <td>Cloud point, 1% aq solution, °C (°F)</td><td>>100 (>212)</td></tr> <tr> <td>HLB</td><td>17.6</td></tr> <tr> <td>pH, 5% aq solution</td><td>7</td></tr> <tr> <td>Viscosity at 25°C (77°F), cP</td><td>490</td></tr> <tr> <td>Density at 25°C (77°F), g/mL</td><td>1.096</td></tr> <tr> <td>Flash Pt, Closed Cup, ASTM D93</td><td>None</td></tr> <tr> <td>Pour point, °C (°F)</td><td>-3 (31)</td></tr> </table> <p>NOTE: Additional physical and chemical property data is located on the product Material Safety Data Sheet.</p>	Actives, wt%	70	Solvent	Water	Appearance	Transparent, pale yellow liquid	Cloud point, 1% aq solution, °C (°F)	>100 (>212)	HLB	17.6	pH, 5% aq solution	7	Viscosity at 25°C (77°F), cP	490	Density at 25°C (77°F), g/mL	1.096	Flash Pt, Closed Cup, ASTM D93	None	Pour point, °C (°F)	-3 (31)	Performance Properties <table> <tr> <td>Equilibrium surface tension¹, dynes/cm</td><td>39</td></tr> <tr> <td>Dynamic surface tension², dynes/cm</td><td>58</td></tr> <tr> <td>Ross-Miles Foam Test, Initial/5 min, 0.1% at 25°C (77°F), mm</td><td>65/30</td></tr> <tr> <td>50°C (122°F)</td><td>126/110</td></tr> </table> <p>¹Measured at 0.1 wt% and 25 °C (77 °F) ²Measured at 0.1 wt% and 25 °C (77 °F), Maximum Bubble Pressure at 4 bubbles/sec</p>	Equilibrium surface tension ¹ , dynes/cm	39	Dynamic surface tension ² , dynes/cm	58	Ross-Miles Foam Test, Initial/5 min, 0.1% at 25°C (77°F), mm	65/30	50°C (122°F)	126/110
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Solubility and Compatibility <ul style="list-style-type: none"> • Soluble in water • Miscible in most polar organic solvents • Insoluble in aliphatic & aromatic hydrocarbons • Chemically stable most acidic & alkaline solutions • Compatible with anionic, cationic, and other nonionic surfactants 	Chemical Description Name: Octylphenol ethoxylate Surfactant Type: Nonionic <div style="text-align: center;">  </div> <p>R = octyl (C8) x = 35 (avg)</p>																												

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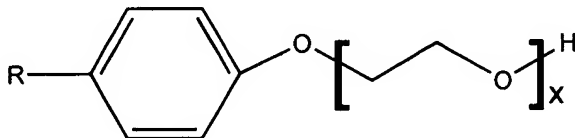
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DOW Surfactants

TRITON® X-705 (70%) Surfactant

Benefits <ul style="list-style-type: none"> • High HLB emulsifier & dispersant • Improves the colloidal stability of emulsion polymer systems including ionic, storage, freeze-thaw, and thermal stability 	Applications <ul style="list-style-type: none"> • Emulsion polymerization 																												
Physical Properties <table> <tr> <td>Actives, wt%</td><td>70</td></tr> <tr> <td>Solvent</td><td>Water</td></tr> <tr> <td>Appearance</td><td>Transparent, pale yellow liquid</td></tr> <tr> <td>Cloud point, 1% aq solution, °C (°F)</td><td>>100 (>212)</td></tr> <tr> <td>HLB</td><td>18.4</td></tr> <tr> <td>pH, 5% aq solution</td><td>7</td></tr> <tr> <td>Viscosity at 25°C (77°F), cP</td><td>505</td></tr> <tr> <td>Density at 25°C (77°F), g/mL</td><td>1.100</td></tr> <tr> <td>Flash Pt, Closed Cup, ASTM D93</td><td>None</td></tr> <tr> <td>Pour point, °C (°F)</td><td>4 (39)</td></tr> </table> <p>NOTE: Additional physical and chemical property data is located on the product Material Safety Data Sheet.</p>	Actives, wt%	70	Solvent	Water	Appearance	Transparent, pale yellow liquid	Cloud point, 1% aq solution, °C (°F)	>100 (>212)	HLB	18.4	pH, 5% aq solution	7	Viscosity at 25°C (77°F), cP	505	Density at 25°C (77°F), g/mL	1.100	Flash Pt, Closed Cup, ASTM D93	None	Pour point, °C (°F)	4 (39)	Performance Properties <table> <tr> <td>Equilibrium surface tension¹, dynes/cm</td><td>41</td></tr> <tr> <td>Dynamic surface tension², dynes/cm</td><td>61</td></tr> <tr> <td>Ross-Miles Foam Test, Initial/5 min, 0.1% at 25°C (77°F), mm</td><td>85/65</td></tr> <tr> <td>50°C (122°F)</td><td>95/90</td></tr> </table> <p>¹Measured at 0.1 wt% and 25 °C (77 °F) ²Measured at 0.1 wt% and 25 °C (77 °F), Maximum Bubble Pressure at 4 bubbles/sec</p>	Equilibrium surface tension ¹ , dynes/cm	41	Dynamic surface tension ² , dynes/cm	61	Ross-Miles Foam Test, Initial/5 min, 0.1% at 25°C (77°F), mm	85/65	50°C (122°F)	95/90
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Solubility and Compatibility <ul style="list-style-type: none"> • Soluble in water • Miscible in most polar organic solvents • Insoluble in aliphatic & aromatic hydrocarbons • Chemically stable most acidic & alkaline solutions • Compatible with anionic, cationic, and other nonionic surfactants 	Chemical Description Name: Octylphenol ethoxylate Surfactant Type: Nonionic <div style="text-align: center;">  </div> <p>R = octyl (C8) x = 55 (avg)</p>																												

Additional product information and performance data is available by requesting datasheets that are listed on the backside of this page.

Datasheets

- DOW Specialty Surfactants Reference Chart, 119-01491
- TRITON & TERGITOL Surfactants for Household, Industrial & Institutional Cleaning CD, 119-01465-0501
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